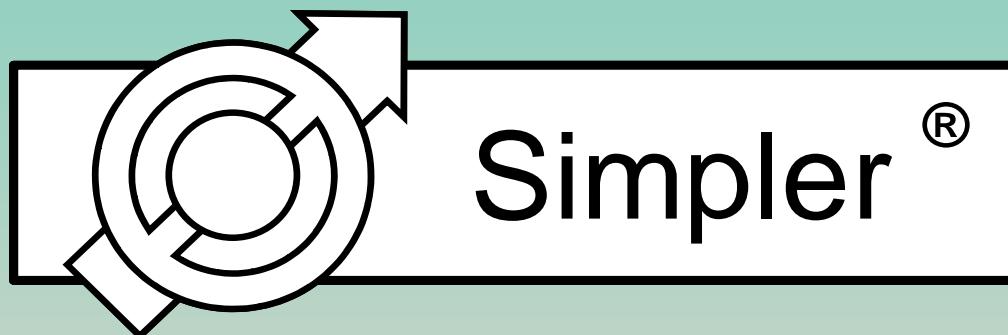
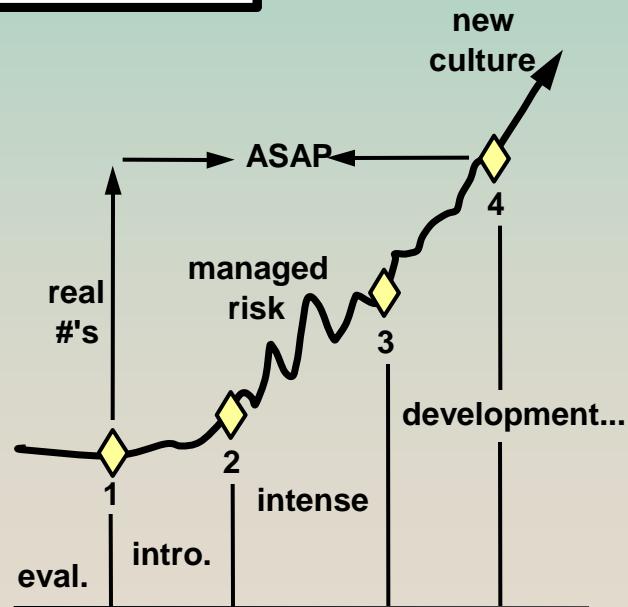


An Introduction to the 3P Breakthrough Method



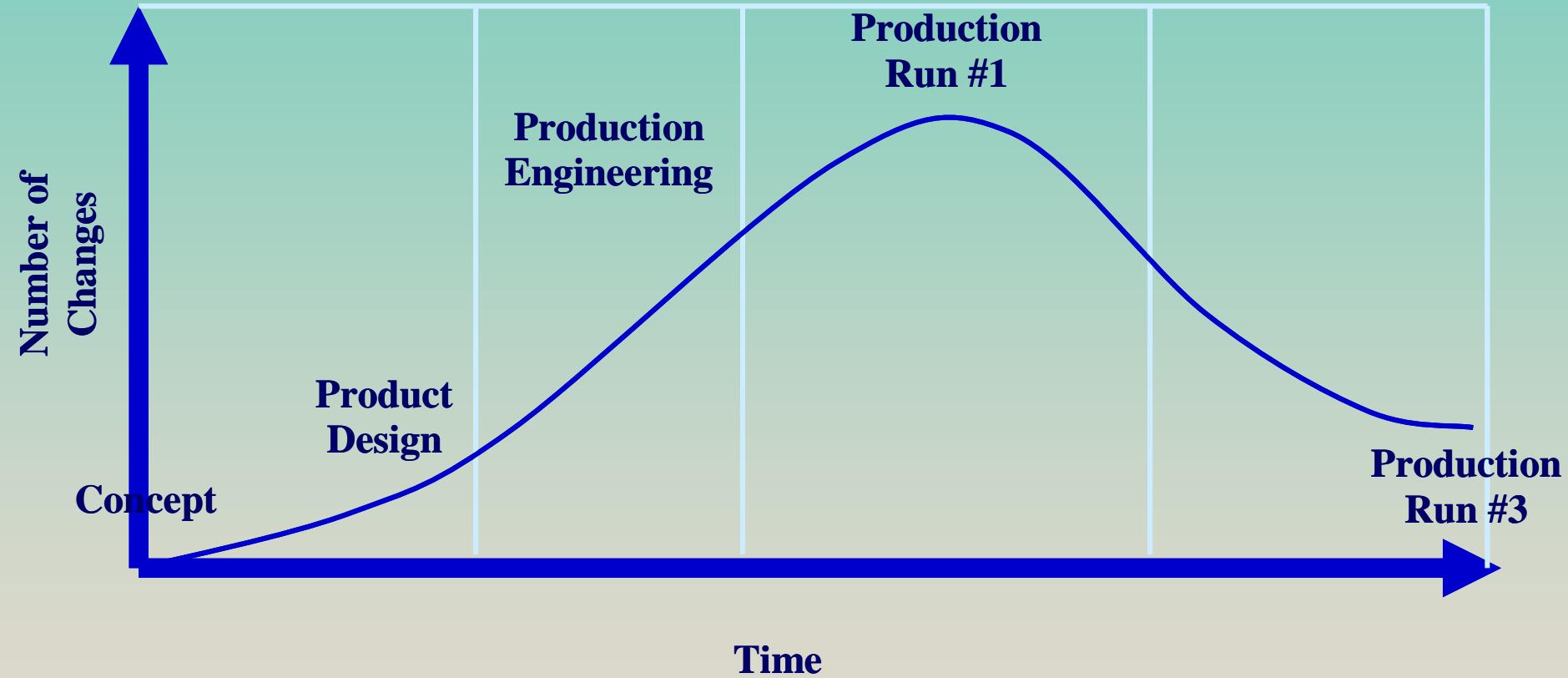
***Building Strategic Advantage through
Enterprise Wide Improvement:***

***People Oriented
Process Focused
Results Driven***

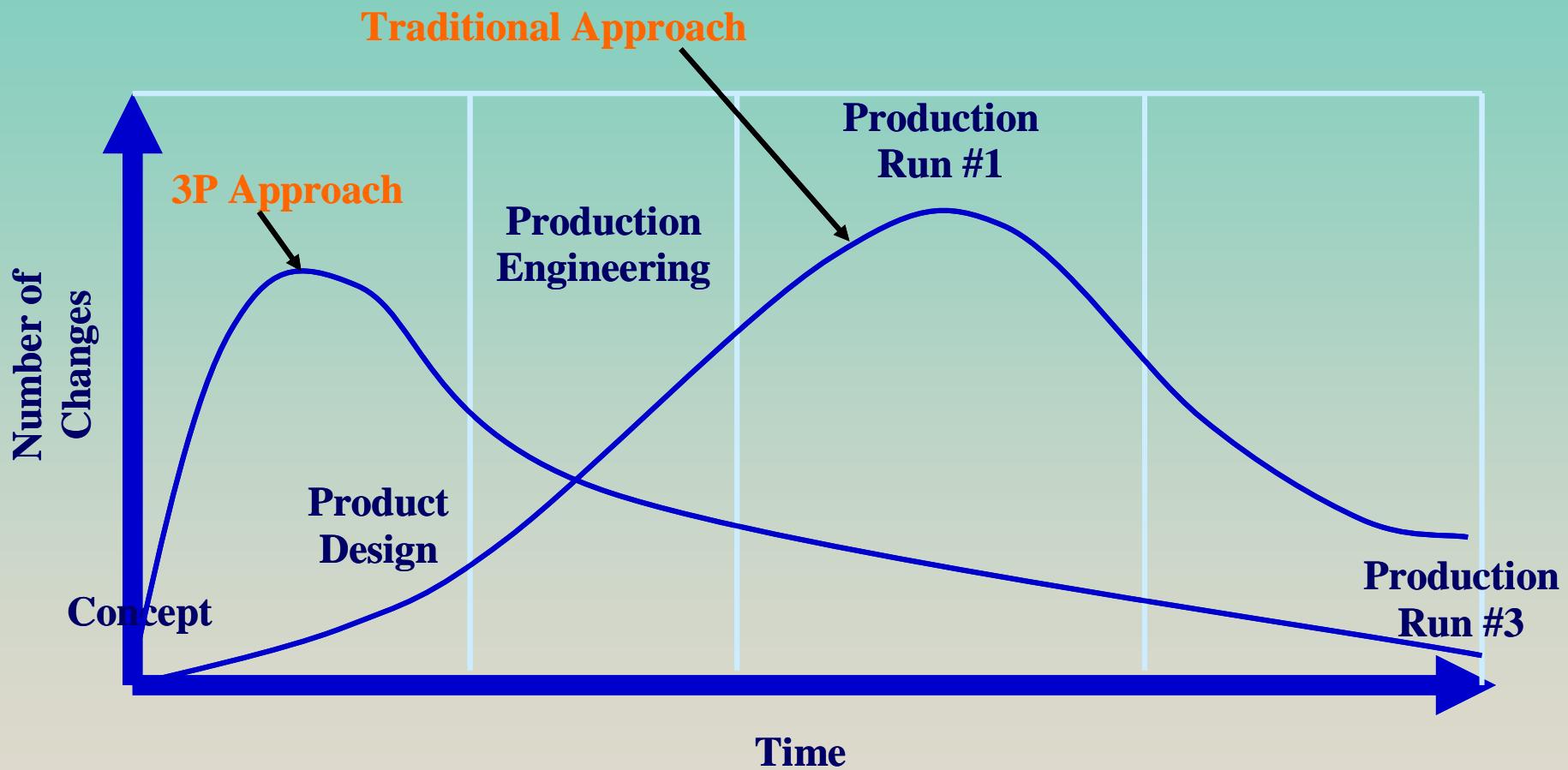


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Traditional Method of Product Launch



3P versus Traditional Approach



The Roots of 3P



Chihiro Nakao
President
Shingijutsu Co.

Production
Process
Preparation

“You cannot build a product or process by merely having knowledge...you must be part of the design. The extent of your involvement in the 3P process will influence how well the product or process is designed.”

Chihiro Nakao



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Vermeer Mfg. Co.

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3P for Processes – A Rule of Thumb

MONUMENTS

vs

3P PROCESSES

1,000 / shift

\$800,000 capital

20 people

4-1/4-4

250 / shift

\$50,000 capital

1 person

4 small cells

1/4 capital intensity

4x productivity



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BEFORE:
\$375,000
wide-belt
sander



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AFTER:

\$8,000 stroke sander

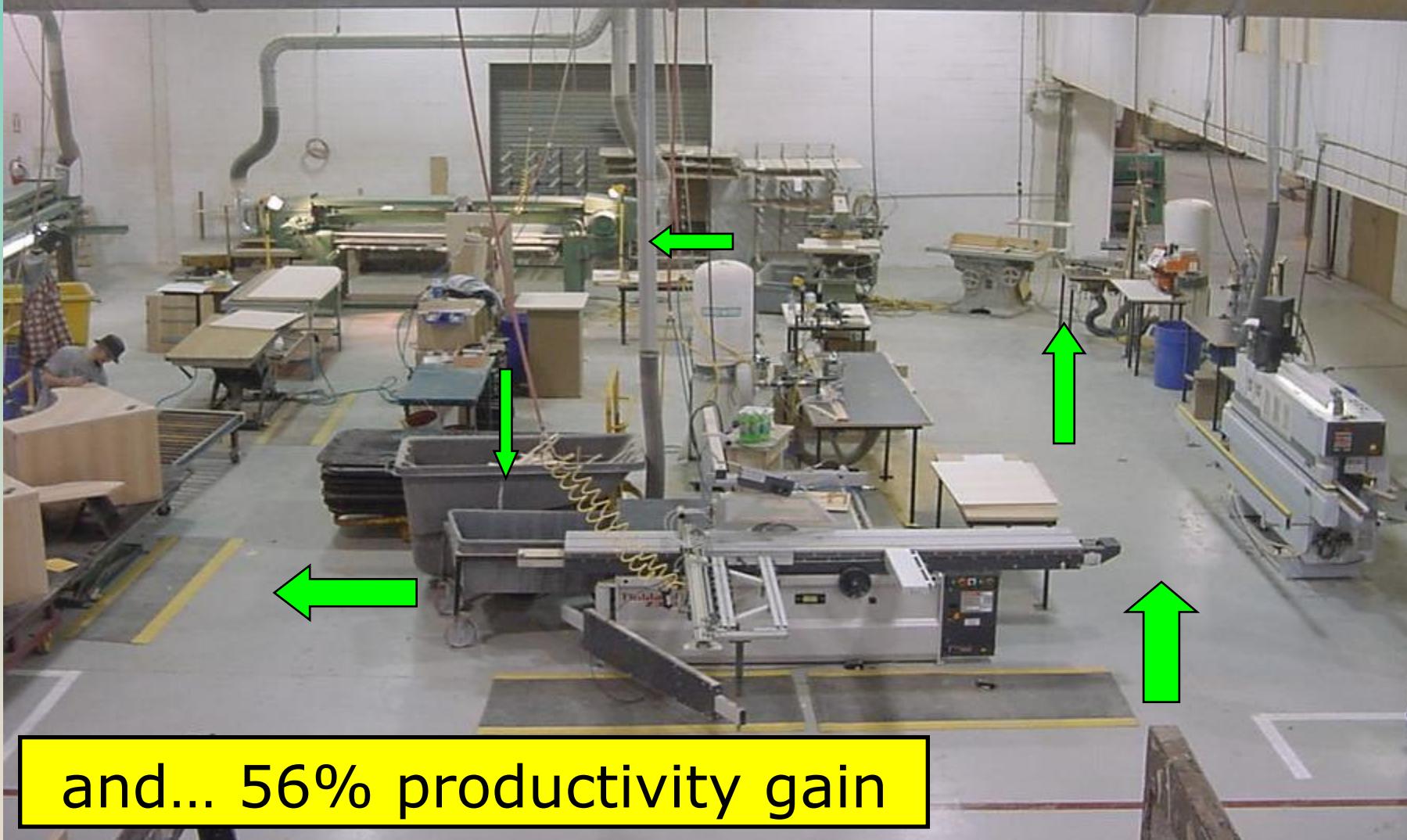




BEFORE:
\$1.4 million equipment
4 week flow time

AFTER:

\$50,000 equipment, 30 minute flow time



and... 56% productivity gain

and... no more WIP racks





creativity not capital



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and... it takes guts
to unplug the
monuments



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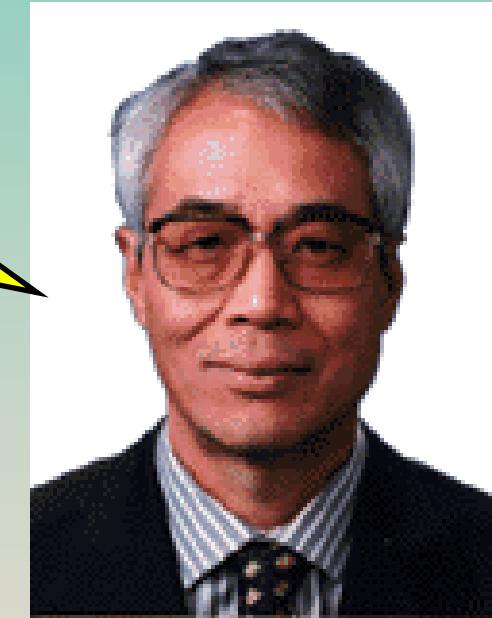
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3P Isn't Just for Processes

- ❑ 3P is being used for:

- ❑ PROCESSES
- ❑ PRODUCTS
- ❑ PARTS

“what are your 3P's?”



the 3P Method generates breakthrough concepts

Where does 3P Fit In?

Quality

“Builds Appropriate Quality into the Product Design and Production Process”

Cost

“Focus on Reducing Both Capital Costs and Product Costs”

Delivery

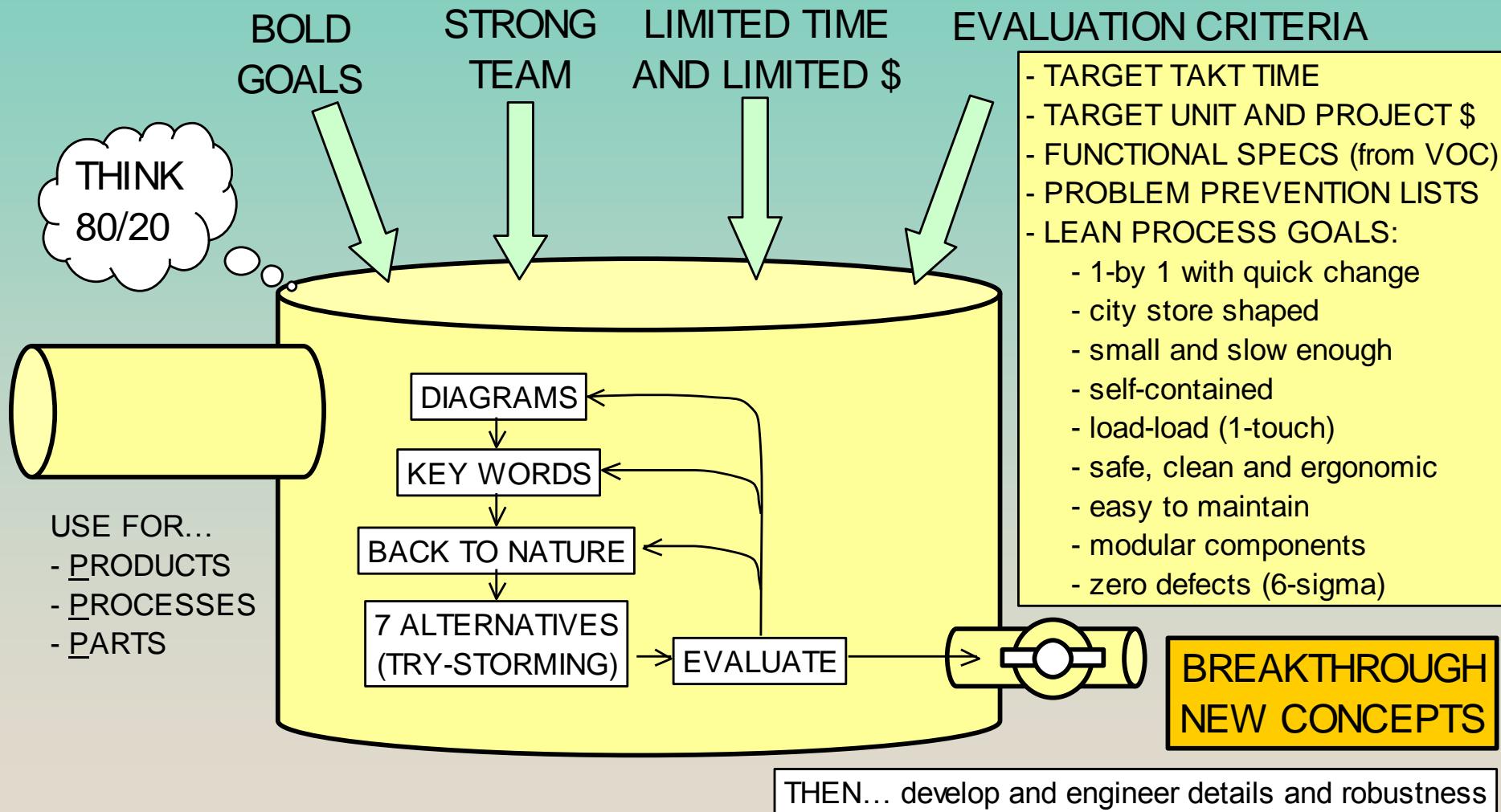
“Launching New Products to the Marketplace ON SCHEDULE ”



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the 3P Method (for Products, Processes, Parts)



for processes, the goal is a “Load-Load” cell

SEPARATE THE OPERATOR FROM THE MACHINE

- 1: ENERGY
- 2: HOLDING
- 3: FEEDING

MANUAL
WORK

- 4: STOPPING
- 5: RETURNING
- 6: UNLOADING

MACHINE
WORK

- 7: CHECKING
- 8: ADVANCING

STOP AT THIS POINT - THIS IS LOAD-LOAD

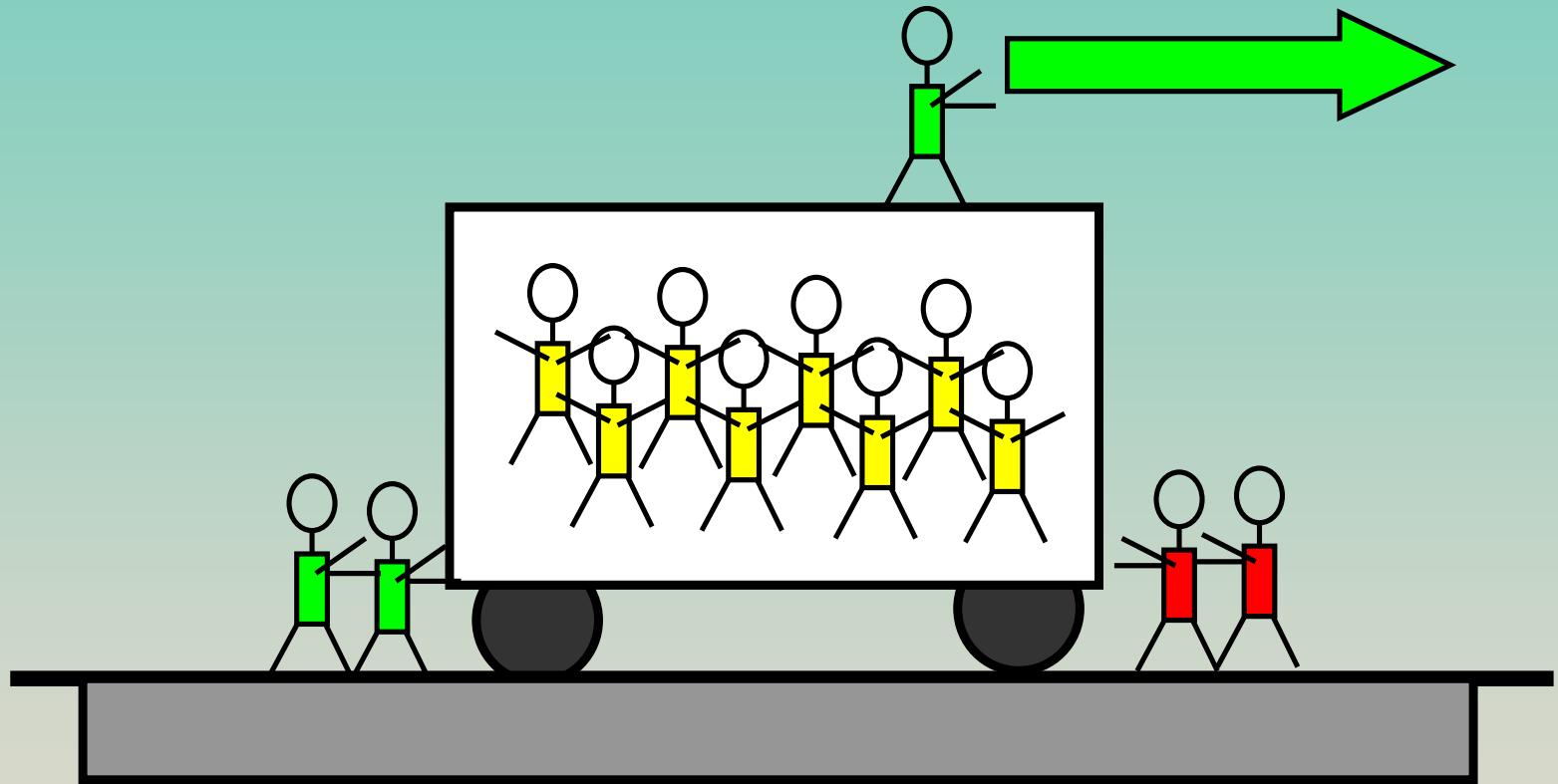
USE 3P TO DEVELOP
RIGHT-SIZED
EQUIPMENT

BUILD IN DEVICES
THAT DETECT
ABNORMALITIES
(TRIGGER VISUAL
ALARMS)

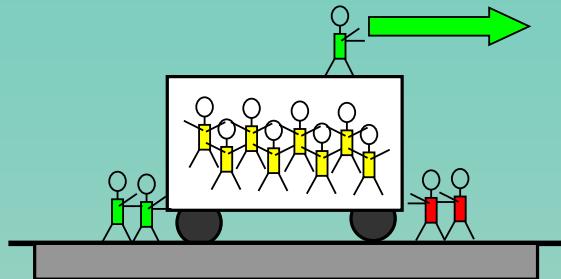
R.I. EVENT GOALS: INCREASE PRODUCTIVITY 30%



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expect resistance



“we got rid of all of those
when we bought our CNC ____”

“you’re taking us back to the
dark ages”

who is most
likely to see
“right-sized”
equipment as a
threat?

“you’re kidding, right?”

“but we need the flexibility”

“new frontiers in low-tech”

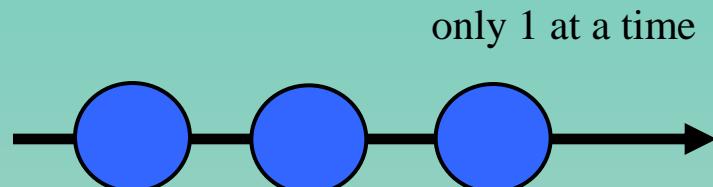
- what is the simplest piece of equipment you have?**
- what does it do?**
- what is your most complicated piece of equipment?**
- what does it do?**
- think back to when you were 12 years old...**
 - YOU COULD UNDERSTAND MANUFACTURING STEPS**
 - YOU COULD SEE WHAT HAPPENS TO MATERIALS**
 - YOU DIDN'T KNOW MUCH ABOUT EQUIPMENT**
- go back to the mindset you had when you were 12**

think about the Material First

- ❑ let's talk about a typical piece of your equipment
 - ❑ **WHAT IS IT? WHAT DOES IT DO?**
 - ❑ **WHAT DOES IT LOOK LIKE?**
 - ❑ **WHY IS IT BUILT THE WAY IT IS? HOW FAST IS IT?**
- ❑ now, let's think about the same equipment differently:
 - ❑ **WHAT HAPPENS TO THE MATERIAL (IN DETAIL)?**
 - ❑ **WHAT TOOL IS USED TO DO THIS WORK?**
 - ❑ **HOW IS THE MATERIAL HELD?**
 - ❑ **HOW IS ENERGY DELIVERED TO THE TOOL?**
 - ❑ **WHAT IS THE TAKT TIME?**
 - ❑ **WHAT IS THE MACHINE CYCLE TIME?**

12 Criteria for Evaluating Equipment

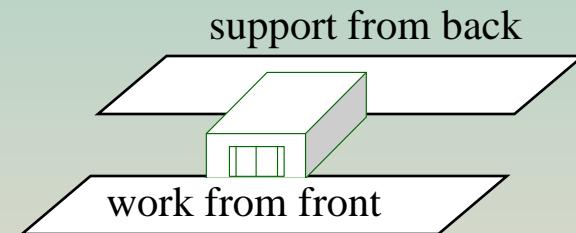
- 1-BY-1 - we want equipment that only processes only one item at a time - it should prevent batches from being done



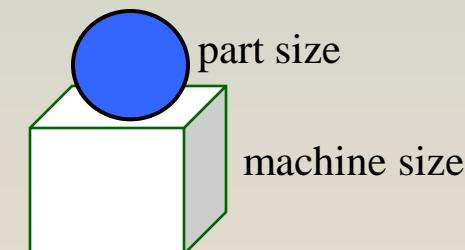
- CITY STORE SHAPED - equipment should have a footprint that is narrow and deep like a city store... it should also be short (max. height 5 feet)



- SIDEWALK SHOPPED - operating should be like shopping from the sidewalk (run from the front only, support from the back only)



- PART SIZED - equipment should be as narrow as possible - its width should be similar to the narrowest dimension of 1 part



12 Criteria for Evaluating Equipment

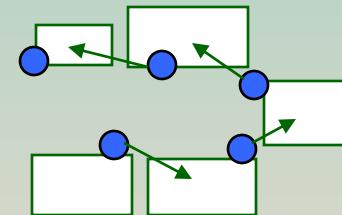
- **SLOW ENOUGH** - equipment cycle time (manual + auto-run time) should be no faster than the target takt time of the cell it's intended for



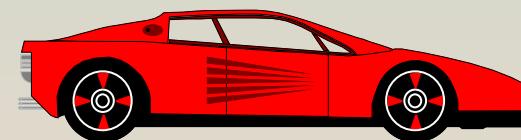
- **NO BAGGAGE** - equipment should be completely self-contained, easy to move immediately, and easy to hook up (1 electric line is best)



- **LOAD-LOAD CONCEPT** - on the “road to Load-Load”, equipment should rate between level 3 and 7, with level 7 possible in the future



- **FAST SETUP** - changeover, if not eliminated, should happen in less than one takt time, and the first part should always be a good part



think "PIT CREW"

12 Criteria for Evaluating Equipment

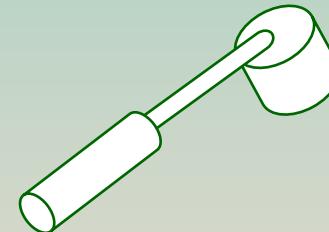
- **SAFE AND CLEAN** - equipment should be safe and ergonomic for the operator, well-guarded and easy to keep clean in less than 60 sec/shift

6-S

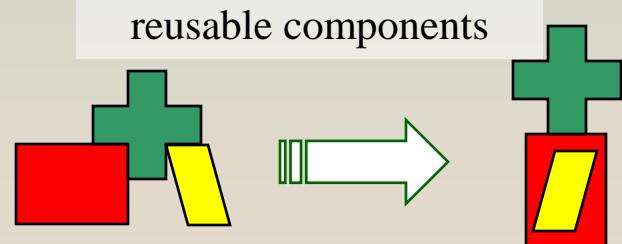
- **EASY TO OPERATE** - correct operating conditions and steps should be visual and visual, and all controls should be in the front



- **EASY TO MAINTAIN** - equipment should be easy to maintain by operator (max. 60 sec/shift) and maint. department (max. 60 min/yr)



- **EASY TO RECONFIGURE** - equipment should consist of mostly standardized modules that can be easily re-used in other machines



3P Process Events

- follow these 9 steps during a 5-day R.I. Event:
 - 1: DEFINE PURPOSE
 - 2: CREATE PART FLOW DIAGRAM
 - 3: CREATE SPAGHETTI DIAGRAM
 - 4: CLARIFY SCOPE
 - 5: GO BACK TO NATURE
 - 6: TRY 7 ALTERNATIVES
 - 7: CHOOSE A CONCEPT
 - 8: BUILD A MOCK-UP
 - 9: BUILD THE REAL EQUIPMENT

Productivity, Capital Savings, Cost Savings

Client: Parker – Racor Division Manufacturer of filters, 3P application for World Truck Filter Element

❑ Baseline data:

- ❑ First ever 3P process at this site
- ❑ Plan was to use traditional filter line
 - ❑ Straight line – 2,100 sq ft
 - ❑ 15 operators
 - ❑ 2 shifts, 1st shift runs Primary Filter, 2nd shift runs Secondary Filter
- ❑ Capital Costs: \$750,000
- ❑ Productivity: 12 ppl/hr
- ❑ Unit Cost Primary Filter: \$13.10
- ❑ Unit Cost Secondary Filter: \$4.82
- ❑ Annual Demand: 300,000 units per each unit (600,000 total)

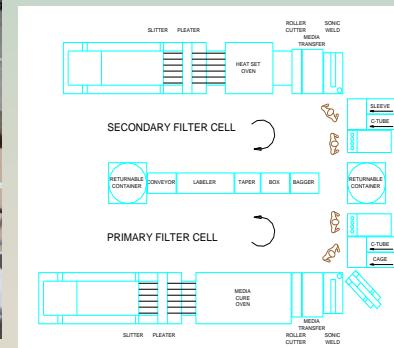
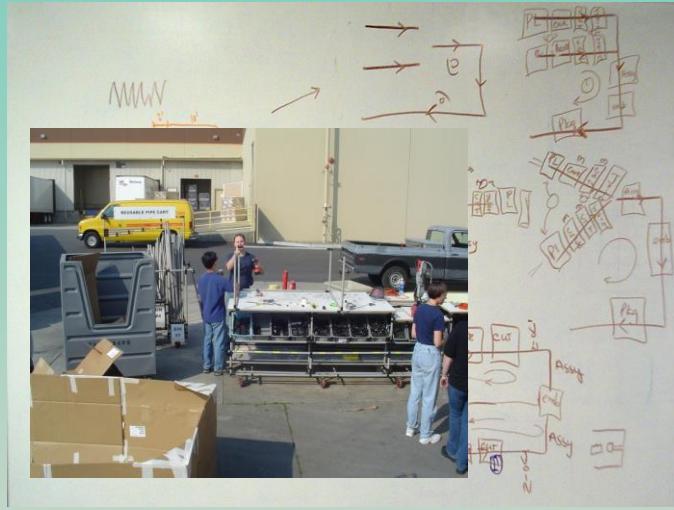
❑ Approach

- ❑ Review physical parts & determine function
- ❑ High level process map
- ❑ Develop keywords
- ❑ Back to nature exercise
- ❑ Generate 7 alternative concepts for each process
- ❑ Trystorming
- ❑ Evaluate alternative using 12+ criteria
- ❑ Design and build mock cell

❑ Results:

- ❑ Productivity: 60ppl/hr. – 4 people, a 400% Improvement
- ❑ Total Capital Savings: \$410,000
- ❑ U-Cell Design, 1 shift, Mistake Proof devices designed.
- ❑ Floor Space Savings: 1,020 sq ft – 51% Reduction
- ❑ New Cost Primary Filter: \$6.22, saving \$6.88/unit a 53% Improvement
- ❑ New Cost Secondary Filter: \$3.32, saving \$1.50/unit a 31% Improvement
- ❑ Total Cost savings @ 600,000 annual units: \$2,514,000/yr

3P Process



3P new product 'World Tiller'

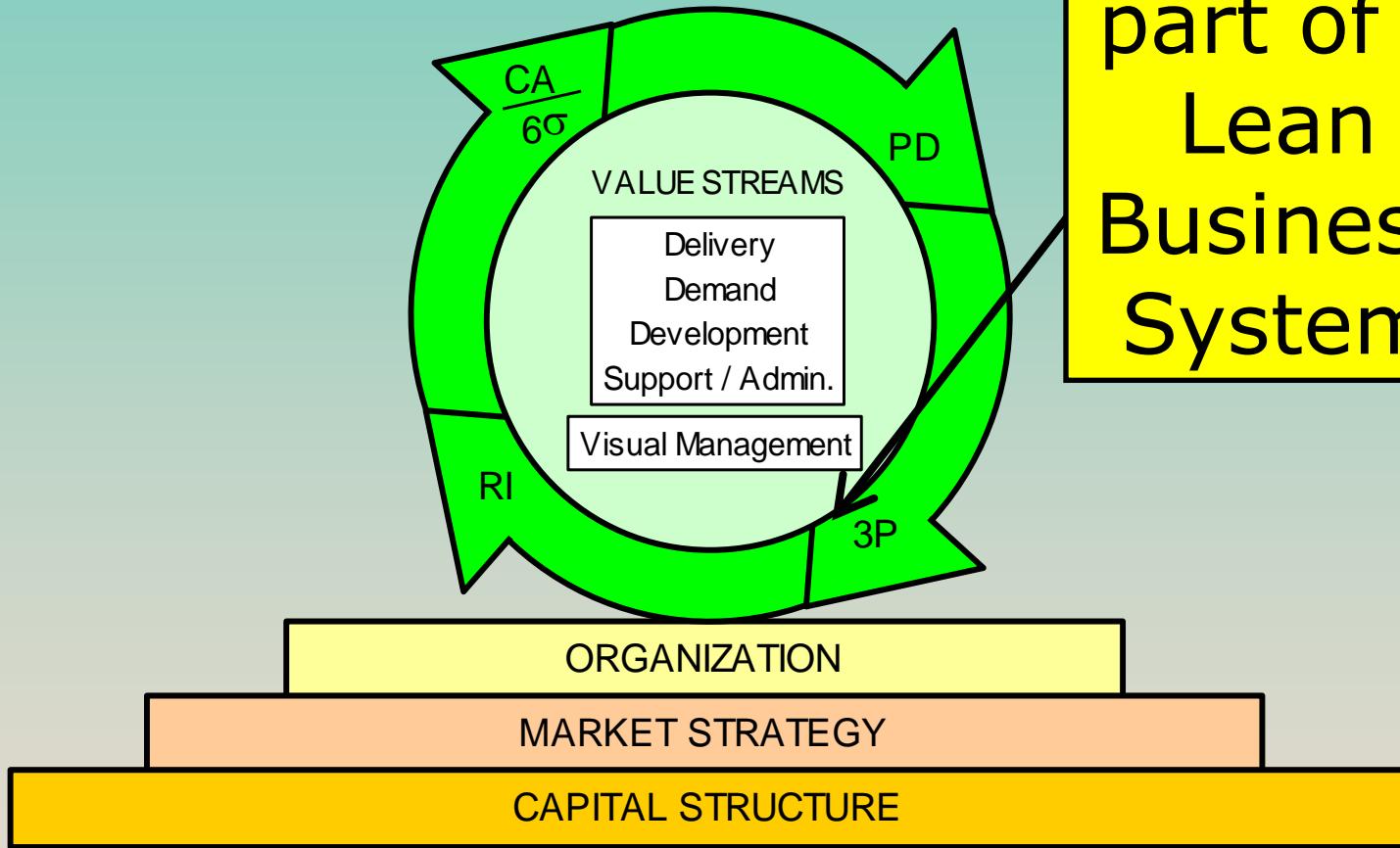
- Client: MTD, Leitchfield, Ky
- Focus: 3P new product line
- Baseline data:
 - Projected product cost = \$6.13/each
 - Projected product cost = \$453,620 annually
 - Projected operators = 12
 - Projected savings = \$ 0.00
 - Action plan = None
- Approach:
 - Trained team on using 3P tools and building mockup equipment for cell flow
 - 7 alternatives; critical evaluation method; process-at-a-glance
 - Conducted time observations; removed process waste and revised layout
 - Created one unit flow and can produce to T/T
 - Conducted group simulation of cell at the presentation
- Results:
 - New projected product cost = \$3.23/each
 - New projected product cost = \$239,020 annually
 - New projected operators = 6
 - Projected savings = \$ 214,600
 - Action plan developed = Complete w/timeline



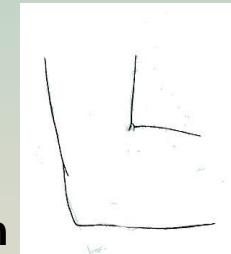
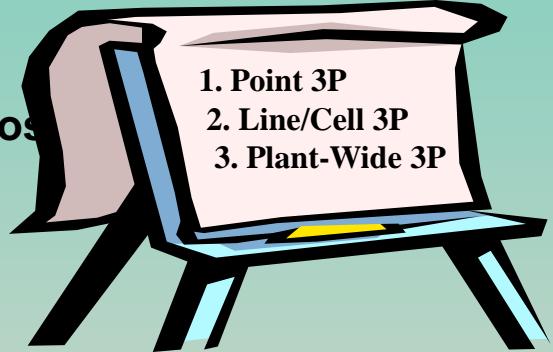
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think of
3P as
part of a
Lean
Business
System

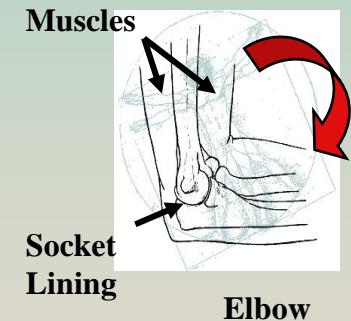
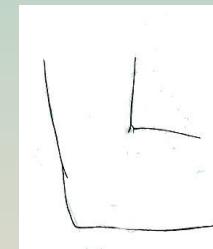


- **Define Event Scope**
 - What is the theme & scope of your event?
- **Define Constraints**
 - Material Costs, Labor Costs, Takt Time, Capital Costs, Size, Energy, etc.
- **Define Goals**
 - Based on Scope and Constraints
- **Go Back to Age 12!**
- **Diagram Material Transformation Steps**
 - One diagram minimum per step.....more is OK
- **Develop and add “Key Words”**
 - Add Simple Descriptive Single Words to describe each step or stage.



Elbow

- **Go Back to Nature**
 - Look for examples of keywords in nature
 - Nature has spent millions of years refining these phenomena
 - Identify 7 Natural solutions to solve the “Key Words” or Functions
- **Quickly develop 7 Alternatives**
 - Draw a sketch that best describes what's happening
 - Keep the sketches to what is happening (adhere vs. weld)
- **Refine the Sketches**
 - What is the condition of the function?
 - Is the sketch feasible?
 - What type of fixturing might be required?
 - What degrees of motion are necessary?
 - What moves: the part or the tool?
 - Concepts should be somewhat different
 - Is the sketch simple enough?
 - Will it require complex machinery?
 - Does it support cellular and modular equipment?



❑ TryStorm all Alternatives

- ❑ Use ready available materials to build your prototypes
- ❑ Start with top view cardboard cut outs of each piece of prototype
- ❑ Make sure each machine has all necessary fixtures
- ❑ What is the cycle time of each operator?
- ❑ What does each layout look like?
- ❑ How much walking distance is there?
- ❑ How balanced are the operators?
- ❑ Are fixtures made that accurately represent cycle time ?

- ❑ **Evaluate all Alternatives against the 12 Evaluation Criteria**
 - ❑ Use decision analysis to help decide which design is best
- ❑ **Mock up Selected Alternative**
 - ❑ Does each drawing accurately represent size and features
 - ❑ What does each layout look like?
 - ❑ How much walking distance is there?
 - ❑ How balanced are the operators?
 - ❑ Are fixtures made that accurately represent cycle time
 - ❑ Prepare final standard work combination sheets for best process
 - ❑ Prepare Cost benefit analysis
 - ❑ Compare/revisit against Scope and Goals
- ❑ **Prepare Final Presentation**